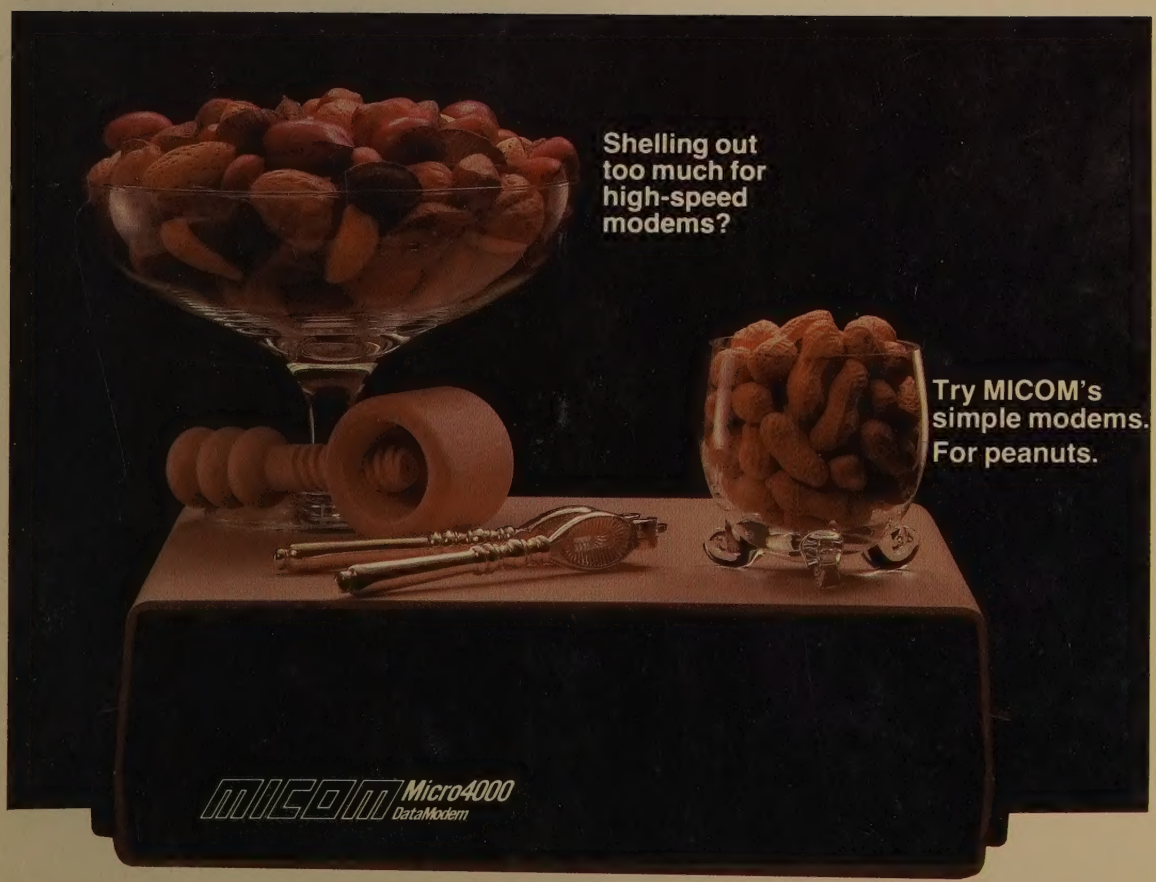
MICOM® Micro4000 DataModem

User's Manual

Models M4024 and M4024/ASYNC

800-1080-4a

Electronic Services - Los Angeles
M14012X



Micro4000
Data Modem

Models M4024 and M4024/ASYNC

User's Manual

Stock Number 800-1080-4a

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If radio frequency interference is encountered after installation of the equipment, necessary corrective measures are required to reduce this interference. Information about recommendations for such measures can be obtained from the manufacturer. Contact MICOM Corporate Headquarters for assistance.

August 1985

Copyright © MICOM Systems, Inc. 1982, 1985
All rights reserved

No part of this manual may be copied without
written permission from MICOM Systems, Inc.

THANK YOU FOR CHOOSING THE Micro4000 M4024 DATA MODEM

The MICOM® Micro4000 M4024, a member of MICOM's family of intelligent data communications products, is designed to help you get the most out of your communications lines.

This M4024 User's Manual, in turn, is designed to help you get the most from your new M4024 by giving you all the information you need to use it effectively.

WARRANTY

MICOM provides a warranty for the M4024. Information about equipment repair by MICOM Customer Service is included on the Warranty Page.

PUBLICATION CHANGE REQUEST

At the end of this manual, there is a postage-paid comment form for you to use if you think of an improvement to (or find a mistake in) this manual.

NOTICE

Specifications, tolerances, and design characteristics described in this manual are subject to change without notice.

WARRANTY

MICOM warrants that the equipment delivered shall be free from defective material and workmanship for a period of 1 year from the date of delivery of equipment when given normal, proper and intended usage, and agrees to repair or replace, without cost, any part manufactured by MICOM provided that:

(a) MICOM is promptly notified upon discovery that the equipment is defective;

(b) The equipment is returned prepaid to the MICOM plant from which the equipment was shipped; and

(c) MICOM's examination of the equipment shall disclose that any defect was not caused by accident, misuse, neglect, alteration, improper installation, unauthorized repair or improper testing.

MICOM may, in its sole discretion, elect to repair or replace the equipment, in which event MICOM shall have a reasonable time to make repairs or to replace the equipment. MICOM will return the equipment freight prepaid.

THE PROVISIONS OF THIS WARRANTY ARE IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND MICOM'S LIABILITY ARISING OUT OF THE MANUFACTURE, SALE, OR SUPPLYING OF THE EQUIPMENT OR ITS USE, WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, PRODUCTS LIABILITY OR OTHERWISE, SHALL NOT EXCEED THE ORIGINAL COST TO THE BUYER OF THE EQUIPMENT. IN NO EVENT SHALL MICOM BE LIABLE TO THE BUYER OR ANY OTHER PERSON OR ENTITY FOR UNINTENDED OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR USE DAMAGES) ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF THE EQUIPMENT.

MICOM warrants all repairs or upgrades performed at its factory location or performed by MICOM Customer Service for a period of 90 days after completion.

HOW TO GET YOUR EQUIPMENT FIXED BY MICOM CUSTOMER SERVICE

MICOM'S Customer Service offers a wide range of support functions, including complete factory repair for both in-warranty and out-of-warranty equipment.

Before returning any equipment, however, please call MICOM Customer Service. Telephone numbers for our Regional Offices are listed on the back of this manual.

A Customer Service engineer will answer warranty-related questions, discuss your specific equipment problems, and — when necessary — give you shipping instructions for returning equipment to MICOM for repair. To return a product for service or repair, you *must* obtain a Return Authorization number from MICOM Customer Service.

Shipping charges must be prepaid.

CONTENTS

Paragraph	Topic	Page
	SECTION 1 — DESCRIPTION	
1.1	INTRODUCING THE Micro4000 2400 bps DATA MODEM	1-1
1.2	HOW TO USE THIS MANUAL	1-1
1.3	APPLICATIONS	1-2
	SECTION 2 — DO-IT-YOURSELF INSTALLATION AND OPERATION	
2.1	UNPACKING AND INSPECTING FOR DAMAGE	2-1
2.1.1	Your Unit Should Arrive in Good Condition	2-1
2.1.2	In Case of Damage	2-1
2.2	INSTALLATION PREPARATION	2-2
2.3	INSTALLATION PROCEDURE	2-3
2.3.1	Standalone Unit	2-3
2.3.2	Rack-Mount Card Module	2-4
2.4	SELECTING A LOCATION FOR YOUR MODEM	2-5
2.5	ACCESSING THE CONFIGURATION SWITCHES	2-6
2.5.1	For Standalone Units	2-6
2.5.2	For Rack-Mount Chassis	2-6
2.6	SETTING CONFIGURATION SWITCHES	2-7
2.7	SETTING STRAPS	2-9
2.7.1	Strapping M4024 and M4124	2-9
2.7.2	Strapping M4024/ASYNC and M4124/ASYNC	2-12
2.8	CONNECTING YOUR MODEM	2-14
2.9	YOUR MODEM POWER SUPPLY	2-16
2.10	STARTING SEQUENCE AND OPERATION CHECK	2-17
2.10.1	Point-to-Point Configuration	2-17
2.10.2	Multipoint Configuration	2-18
	SECTION 3 — SYSTEM TESTING AND CONFIGURATION DETAILS	
3.1	BRIEF DESCRIPTIONS OF OPTIONAL FEATURES	3-1
3.2	STRAPPING SELECTION	3-3
3.2.1	Carrier Detect Threshold	3-3
3.2.2	Phase Shift Select	3-3
3.2.3	Asynchronous/Synchronous Data Select	3-3
3.2.4	Line Loopback Gain	3-3
3.2.5	DSR Option and Analog Loopback	3-3
3.2.6	Switched or Continuous Carrier	3-4
3.2.7	External/Internal/Slave Clocking	3-4
3.2.8	Data Rate Select	3-4
3.2.9	Asynchronous Stop Bit Select	3-4
3.2.10	Asynchronous Code Level Select	3-5
3.2.11	Asynchronous Parity Select	3-5

CONTENTS (continued)

Paragraph	Topic	Page
	SECTION 3 - SYSTEM TESTING AND CONFIGURATION DETAILS (continued)	
3.3	SWITCH SETTING SELECTION	3-6
3.3.1	Equalizer Option	3-6
3.3.2	RTS-to-CTS Delay	3-6
3.3.3	Data Clamp Delay	3-6
3.3.4	Output Level	3-6
3.4	READING YOUR MODEM DISPLAY	3-7
3.5	USING THE DIAGNOSTIC TESTS	3-8
3.5.1	Modem and Line Tests	3-9
3.5.2	Local Modem Test	3-10
3.5.3	Local Modem and Line Test	3-11
3.5.4	Local Modem, Line, and Remote Modem Test	3-12
3.5.5	Full-Duplex Line Test	3-13
	APPENDIX A	
	CABLE WIRING	A-1
	APPENDIX B	
	TECHNICAL SPECIFICATIONS	B-1
	INDEX	
	SUBJECT INDEX	Index-1

FIGURES

Figure	Title	Page
1-1	Typical Modem System Applications	1-2
2-1	Dimensions	2-5
2-2	Access to Switches and Straps	2-6
2-3	Configuration Switch Group Locations	2-7
2-4	Strap Locations for M4024 and M4124	2-9
2-5	Strap Locations for M4024/ASYNC and M4124/ASYNC	2-12
2-6	Cable Connection Locations	2-14
2-7	Standalone Unit Terminal Block Connection	2-15
2-8	Rack-Mount Chassis Terminal Block Connection	2-15
2-9	Cable Connection to Power Supply	2-16
3-1	Model M4100 Rack-Mount Chassis	3-2
3-2	Cabling for M4100	3-2
3-3	Modem Display Location	3-7
3-4	Location of Test Switches	3-8
3-5	Local Loopback Data Flow	3-10
3-6	Local Modem and Line Data Flow	3-11
3-7	Local Modem, Line, and Remote Modem Data Flow	3-12
3-8	Full-Duplex Line Data Flow	3-13
A-1	Typical Terminal Cable Pin Assignments	A-1

TABLES

Table	Title	Page
2-1	Installation Preparation Checklist	2-2
2-2	Configuration Switch Settings	2-8
2-3	Strapping Key for M4024 and M4124	2-10
2-4	Typical Synchronous Multipoint Strapping	2-11
2-5	Typical Synchronous Point-to-Point Strapping	2-11
2-6	Strapping Key for M4024/ASYNC and M4124/ASYNC	2-13
2-7	Typical Asynchronous Point-to-Point Strapping	2-13
3-1	Strapping Chart for M4024/ASYNC and M4124/ASYNC Option	3-5
3-2	Display Functions	3-7

SECTION 1
DESCRIPTION

1.1 INTRODUCING THE Micro4000 2400 bps DATA MODEM

The Micro4000 2400 bps Data Modem is a medium-speed data modem. It is designed for use with asynchronous or synchronous terminal equipment at 2400 and 1200 bps.

It is available in four models:

Model M4024 — standalone unit for synchronous operation
Model M4024/ASYNC — standalone unit for asynchronous operation
Model M4124 — rack-mount module for synchronous operation
Model M4124/ASYNC — rack-mount module for asynchronous operation

Two optional features are available:

Model M4100, the Rack-Mount Chassis Option, mounts up to 13 modules for larger system multiple unit installations at a computer site.

U4024/ASYNC, the Field Upgrade Kit Option, enables the user to change the M4024 to a Model M4024/ASYNC to handle asynchronous data.

1.2 HOW TO USE THIS MANUAL

This User's Manual, just like your Micro4000 M4024 is designed to be easy to use:

Section 2 Do-It-Yourself Installation and Operation contains a "bare bones" procedure for installing your modem.

[Included at the beginning of section 2 is a checklist to help you prepare for installation, if necessary.]

Section 3 System Testing and Configuration Details contains additional details on standard and optional features to aid you in your installation and operation.

Section 3 also contains decision criteria which can help you design your system to meet your data communications needs.

Appendixes contain details on a variety of topics which are included to help you solve your technical problems.

An *Index* is provided. It is a subject index in alphabetical order.

1.3 APPLICATIONS

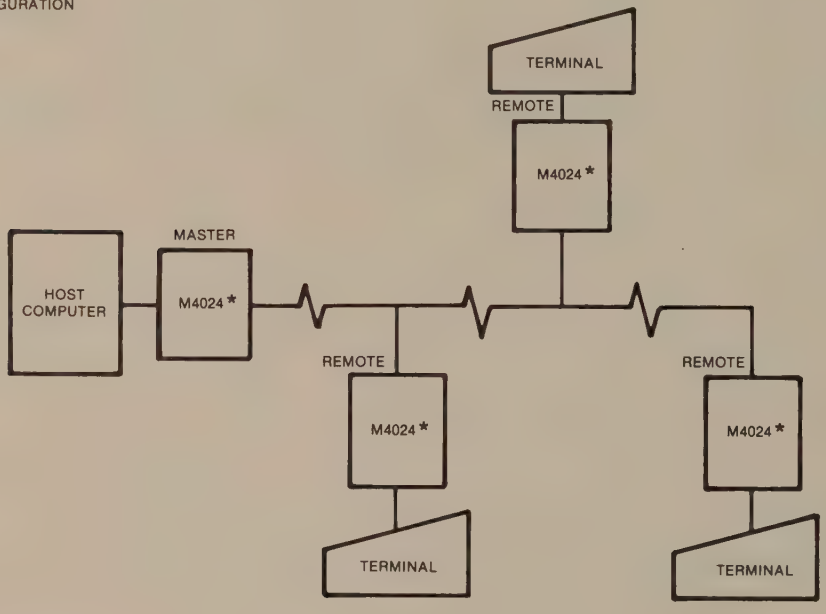
Figure 1-1 shows two applications for a 2400 bps system operation. Multipoint operation requires terminals that are:

- capable of being polled,
- asynchronous or synchronous, and
- operate at the same speed.

Point-to-Point operation requires that the Data Terminal Equipment must be:

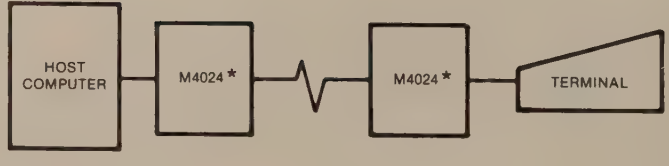
- asynchronous or synchronous, and
- operate at the same speed.

MULTIPOINT CONFIGURATION



MI-4000-01

POINT-TO-POINT CONFIGURATION



* ALSO FOR M4124, M4024/ASYNC, OR M4124/ASYNC

MI-4000-02

Figure 1-1. Typical Modem System Applications

SECTION 2
DO-IT-YOURSELF INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTING FOR DAMAGE

Your unit is packed completely assembled, ready for use.

Inside the box, you should find (check the Packing List):

- Your unit
- This manual
- A separate power supply for standalone units.

2.1.1 Your Unit Should Arrive In Good Condition

- MICOM thoroughly inspected and carefully packed your unit.
- The CARRIER accepted responsibility for its safe delivery.

2.1.2 In Case of Damage

- Note visible damages directly on the freight bill and have the CARRIER acknowledge them.
- Report concealed damage to the CARRIER — immediately upon discovery.
- Submit damage claims to the CARRIER, not to MICOM.

2.2 INSTALLATION PREPARATION

The Installation Preparation Checklist (table 2-1) is designed to help you get ready for your initial installation.

(Making a *copy* of the checklist for mark-up will ensure that you will have a checklist to use in the future.)

Table 2-1. Installation Preparation Checklist

1.	MODEL	☐ M4024	☐ M4024/ASYNC	☐ M4124	☐ M4124/ASYNC
2.	PACKAGING	☐ Standalone		☐ Rack-Mount	
3.	VOLTAGE	☐ 115 ac (USA)		☐ 230 ac (Export)	
4.	OPERATION	☐ Point-to-Point		☐ Multipoint	
5.	DATA RATE	☐ 1200 bps		☐ 2400 bps	
6.	PARITY*	☐ Odd	☐ Even	☐ None	
7.	CODE LEVEL*	☐ 6 bits	☐ 7 bits	☐ 8 bits	☐ 9 bits
8.	STOP BITS*	☐ One		☐ Two	
9.	CARRIER DETECT THRESHOLD	☐ -40 dBm		☐ -26 dBm	
10.	PHASE SHIFT	☐ CCITT V.26A		☐ Bell 201B/CCITT V.26B	
11.	LOOPBACK GAIN	☐ 12 dB		☐ 0 dB	
12.	CLOCKING	☐ EXT	☐ INT	☐ SLV	
13.	DSR OPTION	☐ ON	☐ OFF		

* M4024/ASYNC and M4124/ASYNC only

2.3 INSTALLATION PROCEDURE

The Installation Procedure gives you the required steps for Do-It-Yourself Installation. The procedure will take you from selecting a location to the start-up of the unit. Page references in each step direct you to detailed descriptions for that function.

2.3.1 Standalone Unit

1. Select a location site for your unit (page 2-5).

2. Open your unit (page 2-6).

3. Check settings of the configuration switches and straps. If they are in the desired settings, proceed to the next step. If they are not in the desired settings, set them according to your equipment requirements.

    a. For switch settings, see table 2-2.

    b. For strap settings on M4024 and M4124, see table 2-3.

    c. For strap settings on M4024/ASYNC and M4124/ASYNC, see tables 2-3 and 2-6.

4. Connect the communications (telephone) line to the modem terminal block (page 2-15).

5. Connect the cable from the terminal to the DTE connector (page 2-14).

6. Attach power supply unit lead to modem power connector (page 2-16), then close unit.

7. Plug power supply unit into a grounded outlet (page 2-16); display indicator(s) should turn ON.

8. Observe indicators on the front panel of the modem. These will indicate the status of communication between your equipment. Interpret the display according to your configuration:

    Point-to-Point (page 2-17)
    Multipoint (page 2-18)

2.3.2 Rack-Mount Card Module

1. Pull down the hinged front panel of the rack-mount chassis (page 2-6).

2. Slide the card module out (page 2-6).

3. Check settings of configuration switches and straps. If they are in the desired settings, proceed to the next step. If they are not in the desired settings, set them according to your equipment requirements.

    a. For switch settings, see table 2-2.

    b. For strap settings on M4024 and M4124, see table 2-3.

    c. For strap settings on M4024/ASYNC and M4124/ASYNC, see tables 2-3 and 2-6.

4. Slide the card module into the rack-mount chassis. (The edge connector on the card module inserts into the power connector at the rear of the chassis. See figure 3-1.) Close hinged front panel.

5. Connect the communications (telephone) line to the rack-mount chassis terminal block (figure 3-2).

6. Connect the cable from the terminal to the DTE connection (figure 3-2).

7. Plug power cord into a grounded outlet; display indicator(s) should turn ON.

8. Observe the indicators on front panel of the modem. These will show the status of communication between your equipment. Interpret the display according to your configuration:

    Point-to-Point (page 2-17)
    Multipoint (page 2-18)

2.4 SELECTING A LOCATION FOR YOUR MODEM

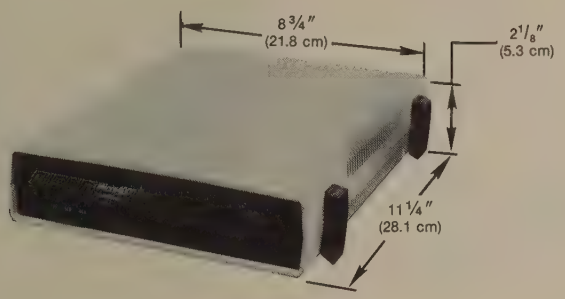
Your modem is designed for standard table-top placement or optional rack-mount installation. Your modem should be located near your computer or terminal so that your interface cables will reach. Your modem should also be located within six feet of a grounded ac outlet.

CAUTION

Do not stack other equipment on top of the standalone unit as this may damage the circuit board by pressing on the board components.

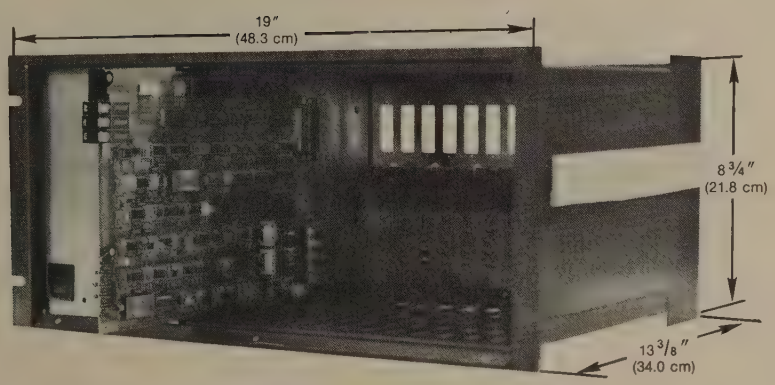
Provide sufficient space for cover removal, switch access, and unobstructed air flow around your modem. To aid you in planning for space requirements, the dimensions of units are listed in figure 2-1.

STANDALONE UNIT



MP-4000-01.2c

RACK-MOUNT CHASSIS



MP-4000-06.2c

Figure 2-1. Dimensions

2.5 ACCESSING THE CONFIGURATION SWITCHES

To perform the next steps in do-it-yourself installation, you must open your modem to gain access to switches and straps located inside (see figure 2-2).

2.5.1 For Standalone Units

Remove the top cover of your unit by unfastening four latches (two on each side of the unit) — pull bottoms of latches away from unit to release.

A label on the bottom of the standalone unit identifies the configuration as M4024 or M4024/ASYNC.

2.5.2 For Rack-Mount Chassis

Pull down the front panel of the rack-mount chassis. Using ejector, slide the module out.

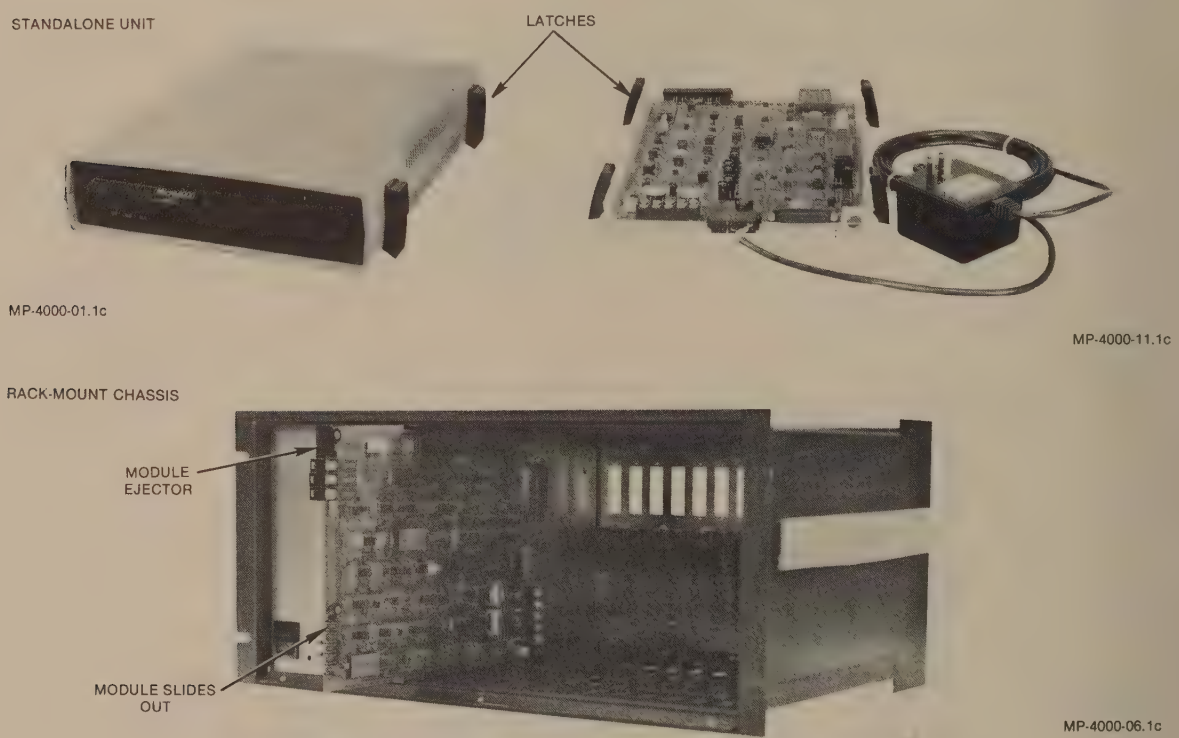


Figure 2-2. Access to Switches and Straps

2.6 SETTING CONFIGURATION SWITCHES

Your modem has two configuration switch groups (see figure 2-3).

NOTE

Configuration switch groups may have different designators to indicate on or off. In this manual ON and OFF are used to designate the following equivalent terms:

ON: Down, Closed
OFF: Up, Open

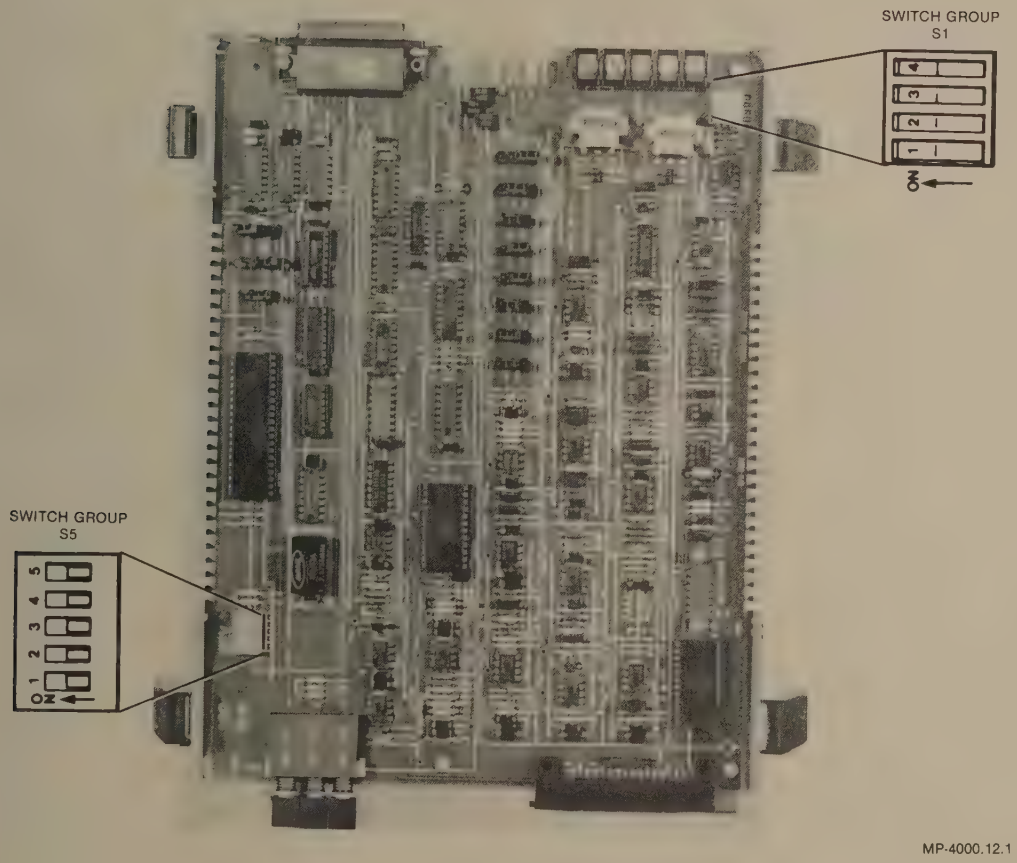


Figure 2-3. Configuration Switch Group Locations

Table 2-2 lists the settings for switch groups S1 and S5. Select the settings which meet your requirements. If you require additional information, refer to section 3.

Table 2-2. Configuration Switch Settings

Switch Group	Description or Function	Switch Position Settings and Meaning
S1	Output Level (± 0.5 dB)	1 2 3 4 OFF OFF OFF OFF 0 dBm* ON OFF OFF OFF -1 dBm OFF ON OFF OFF -2 dBm ON ON OFF OFF -3 dBm OFF OFF ON OFF -4 dBm ON OFF ON OFF -5 dBm OFF ON ON OFF -6 dBm ON ON ON OFF -7 dBm OFF OFF OFF ON -8 dBm ON OFF OFF ON -9 dBm OFF ON OFF ON -10 dBm ON ON OFF ON -11 dBm OFF OFF ON ON -12 dBm ON OFF ON ON -13 dBm OFF ON ON ON -14 dBm ON ON ON ON -15 dBm
S5	Equalizer Option	1 OFF Data taken from equalizer* ON Equalizer bypassed
	RTS/CTS Delay	2 3 OFF ON 9 ms ± 1 ms* OFF OFF 25 ms ± 1 ms ON ON 150 ms ± 1 ms ON OFF Unassigned
	Data Clamp Delay	4 5 ON OFF 4 ms ± 1 ms* ON ON 21 ms ± 1 ms OFF ON 104 ms ± 1 ms OFF OFF Unassigned
* Factory standard position		

2.7 SETTING STRAPS

2.7.1 Strapping M4024 and M4124

Insulated straps are used to connect designated pairs of pins on header sockets W1 through W8.

Figure 2-4 and table 2-3 illustrate the strapping for the M4024 and M4124. Tables 2-4 and 2-5 show typical synchronous strapping for multipoint and point-to-point operation, respectively.

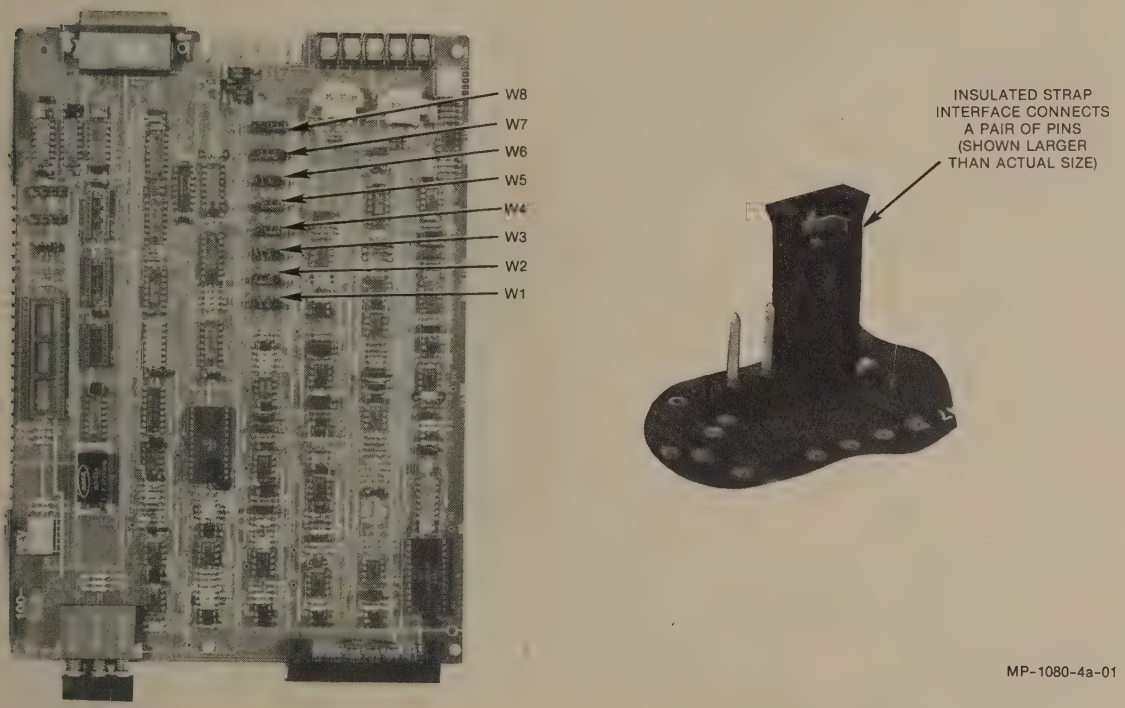


Figure 2-4. Strap Locations for M4024 and M4124

Table 2-3. Strapping Key for M4024 and M4124

Strap	Description or Function	Setting	Meaning
W1	Carrier Detect Threshold	-40 -26	-40 dBm -26 dBm*
W2	Phase Shift Select	A B	CCITT V.26A* CCITT V.26B (Bell 201B)
W3	Asynchronous/ Synchronous Data Select	ASY SYN	Asynchronous Synchronous*
W4	Line Loopback Gain	12 0	12 dB (USA)* 0 dB (CCITT)
W5	DSR Option and Line Loopback	ON OFF	DSR ON* DSR OFF
W6	Switched or Continuous Carrier	CON SW	Continuous Switched*
W7	External/Internal/ Slave Clocking	EXT INT SLV	External Internal* Slave
W8	Data Rate Select	1.2 2.4 EXT	1200 (bps) 2400 (bps)* External
W9 W10 W11	Not Used		No Effect

* Factory strapped option

If you require additional information on strapping your modem, refer to section 3.

Table 2-4. Typical Synchronous Multipoint Strapping

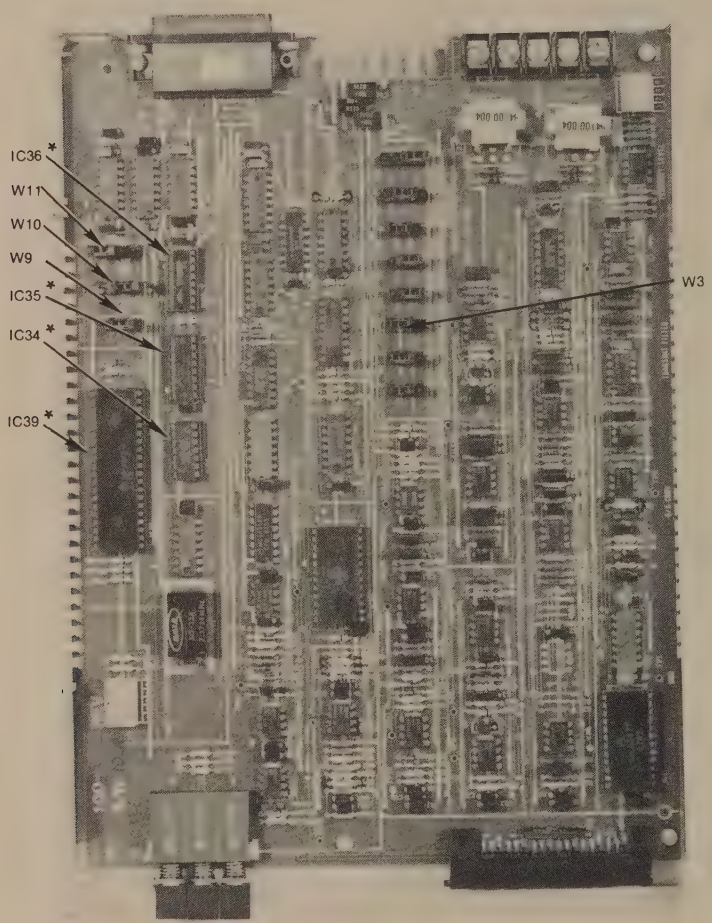
Strap	Central Modem*	Remote Modem*
W1	-26	-26
W2	A	A
W3	SYN	SYN
W4	12 (USA)	12 (USA)
W5	ON	ON
W6	CON	SW
W7	INT	INT
W8	2.4	2.4
W9-W11	(Not Used)	(Not Used)
* M4024 or M4124		

Table 2-5. Typical Synchronous Point-to-Point Strapping

Strap	Local and Remote Modems*
W1	-26
W2	A
W3	SYN
W4	12 (USA)
W5	ON
W6	SW
W7	INT
W8	2.4
W9-W11	(Not Used)
* M4024 or M4124	

2.7.2 Strapping M4024/ASYNC and M4124/ASYNC

Figure 2-5 and tables 2-6 and 2-7 illustrate strapping for Models M4024/ASYNC and M4124/ASYNC. Table 2-7 shows typical asynchronous point-to-point strapping. The integrated circuit chips IC34, IC35, IC36, and IC39 are either factory-installed or converted by a customer using an upgrade kit. (Refer to Field Upgrade Kit Installation Procedure, Stock Number 800-1107.)



* NOTE THAT ALL THE IC SOCKETS ARE FILLED ON THE ASYNCHRONOUS MODULES.

MP-1080-4a-02

Figure 2-5. Strap Locations for M4024/ASYNC and M4124/ASYNC

Table 2-6. Strapping Key for M4024/ASYNC and M4124/ASYNC

Strap	Description or Function	Setting	Meaning
W1 W2	See table 2-3	• • •	• • •
W3	Asynchronous/ Synchronous Data Select	ASY SYN	Asynchronous* Synchronous
W4 through W8	See table 2-3	• • •	• • •
W9	Asynchronous Stop Bit Select	2 1	2 Stop Bits 1 Stop Bit*
W10	Asynchronous Code Level Select	6 7 8	6 Bits 7 Bits 8 Bits*
W11	Asynchronous Parity Select	NONE ODD EVEN	None* Odd Parity Even Parity
* Factory strapped option			

Table 2-7. Typical Asynchronous Point-to-Point Strapping

Strap	Remote and Local Modems*
W1	-26
W2	A
W3	ASY
W4	12 (USA)
W5	ON
W6	CON
W7	INT
W8	2.4
W9	1
W10	8
W11	NONE
* M4024/ASYNC or M4124/ASYNC	

If you require additional information on strapping your M4024/ASYNC or M4124/ASYNC, refer to section 3.

2.8 CONNECTING YOUR MODEM

There are three types of connections you must make to successfully install your modem. The first is the Data Terminal Equipment (DTE) cable (see figure 2-6). The second is the communications (telephone) line interface (see figures 2-7 and 2-8). The third is the power supply (see figure 2-9). (Figure 2-6 shows the locations for all three connections.)

CAUTION

This unit incorporates components to provide protection from lightning and other high voltage discharges and complies with Part 68 of the FCC rules. Connection to lines not provided with lightning protection equivalent to the levels outlined in Part 68 could be hazardous.

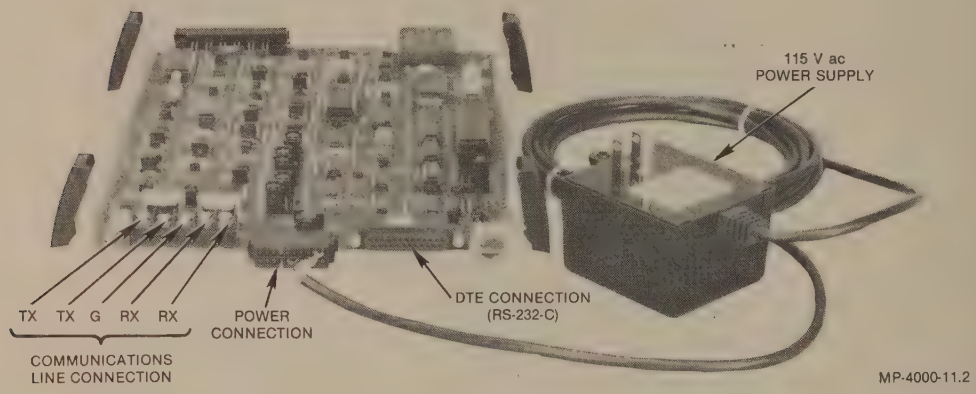


Figure 2-6. Cable Connection Locations

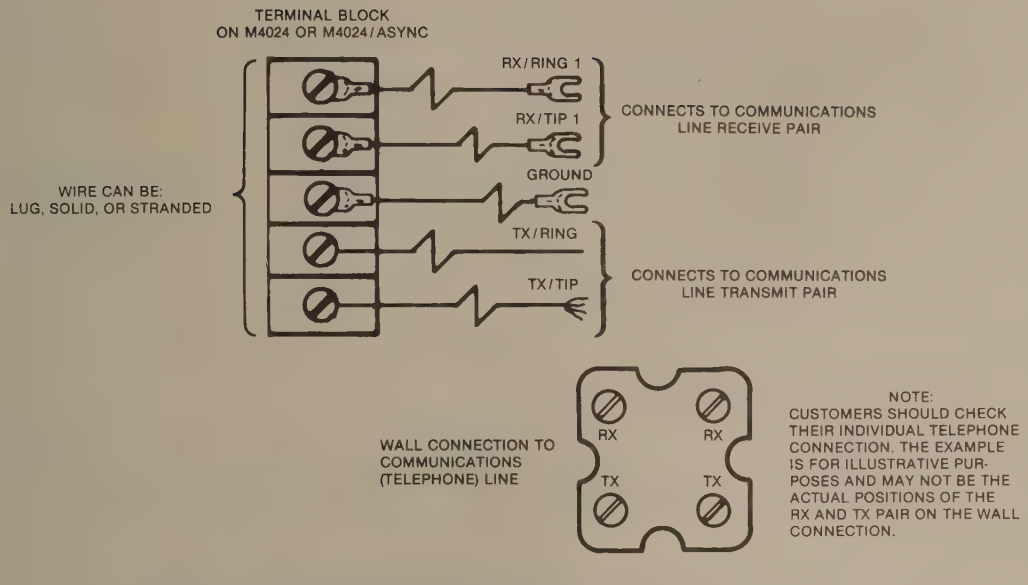


Figure 2-7. Standalone Unit Terminal Block Connection

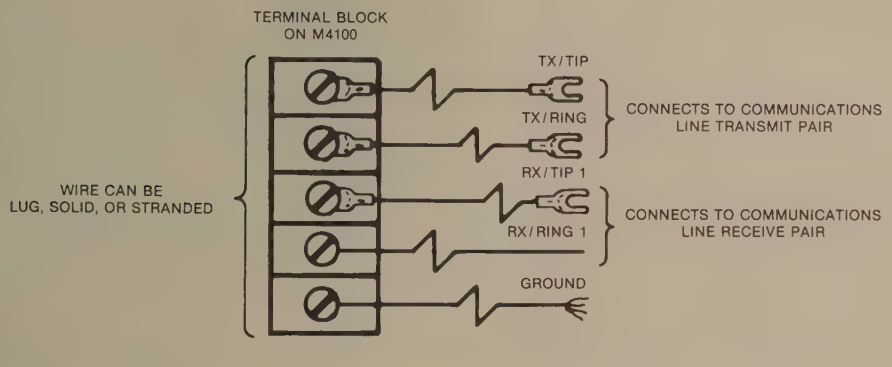


Figure 2-8. Rack-Mount Chassis Terminal Block Connection

2.9 YOUR MODEM POWER SUPPLY

One of two different power supplies may be installed in your unit, depending on whether it is intended for 115 V ac (USA) or 230 V ac (export) operation.

There are no switches or adjustments on your power supply. It need only be connected to your unit and inserted into a wall ac power outlet. See figure 2-9.

The power supply shown below operates at 115 V ac ± 10%. (See figure 3-1 for rack-mount power supply.)

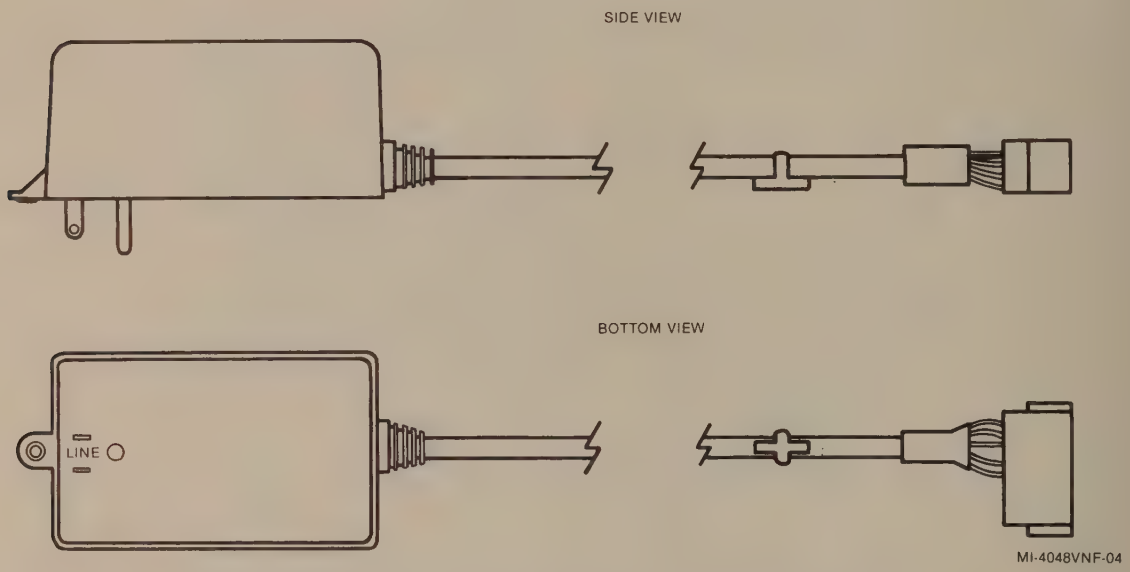


Figure 2-9. Cable Connection to Power Supply

2.10 STARTING SEQUENCE AND OPERATION CHECK

2.10.1 Point-to-Point Configuration

First, connect your DTE cable to the modem.
Second, connect the communications (telephone) line to terminal block.
Third, connect power supply to the modem and plug it into a wall outlet.

DSR should turn ON indicating the modem is powered up and not in line loopback mode.

When the local modem is first plugged in and communication is not yet established with the remote modem, the display should be as follows:

DSR — ON
RTS — ON (when received from DTE)
CTS — ON
CD — OFF (until signal is received from remote modem)

Next, establish communications with the remote modem as per your regular operating procedures.

When communication has been established with the remote modem, the local display should be as follows:

DSR — ON
RTS — ON
CTS — ON
CD — ON
TD — FLICKERING (data transmitted)
RD — FLICKERING (data received)

You may wish to run a test prior to transmitting data. Perform the following simple steps:

- Call the remote location and have the DLB switch engaged.
- Engage the TST switch at the local modem.

The local display should be:

DSR — ON
RTS — ON
CTS — ON
CD — ON
TD — OFF
RD — OFF (flashes ON for errors; for a listing of diagnostic tests, refer to paragraph 3.5.1)

Disengage the TST and DLB switches at the local and remote modems.

If your indications are different from those described above, refer to paragraph 3.5.1 for a listing of diagnostic tests.

2.10.2 Multipoint Configuration

First, connect your DTE cable to the modem.
Second, connect the communications (telephone) line to terminal block.
Third, connect power supply to the modem and plug it into a wall outlet.

DSR should turn ON indicating the modem is powered up and not in line loopback.

When the central modem is first plugged in and communication is not yet established with the remote modems, the display should be as follows:

DSR — ON
RTS — ON (either received from DTE or modem strapped for continuous carrier)
CTS — ON
CD — OFF (until signal received from remote modems)

Next, establish communications with the remote modems as per regular operating procedures.

When communication has been established with the remote modems, the central modem display should be as follows:

DSR — ON
RTS — ON
CTS — ON
CD — ON and OFF (alternating)
TD — FLICKERING (data transmitted)
RD — FLICKERING (data received)

And the remote display should be:

DSR — ON
RTS — ON and OFF (alternating)
CTS — ON and OFF (alternating)
CD — ON
TD — FLICKERING (data transmitted)
RD — FLICKERING (data received)

You may wish to run a test prior to transmitting data. Perform the following simple steps:

- Call the remote locations, one at a time in sequence, and have the DLB switch engaged.
- Engage the TST switch at the central modem.

The central modem display should be:

DSR — ON
RTS — ON
CTS — ON
CD — ON
TD — OFF
RD — OFF (flashes ON for errors; for a listing of diagnostic tests, refer to paragraph 3.5.1)

Disengage the TST and DLB switches at the central and remote modems.

If your indications are different from those described above, refer to paragraph 3.5.1 for a listing of diagnostic tests.

SECTION 3
SYSTEM TESTING AND CONFIGURATION DETAILS

3.1 BRIEF DESCRIPTIONS OF OPTIONAL FEATURES

The 2400 bps modems are available with two optional features.

Model M4100, the Rack-Mount Chassis Option, is a modem rack-mount chassis, allowing a multiple unit installation at a computer site. See figure 3-1.

The modem rack-mount chassis is designed to accommodate 13 Model M4124 or M4124/ASYNC 2400 bps data modems. Regulated dc power is supplied to each modem from either a single power supply or redundant power supplies.

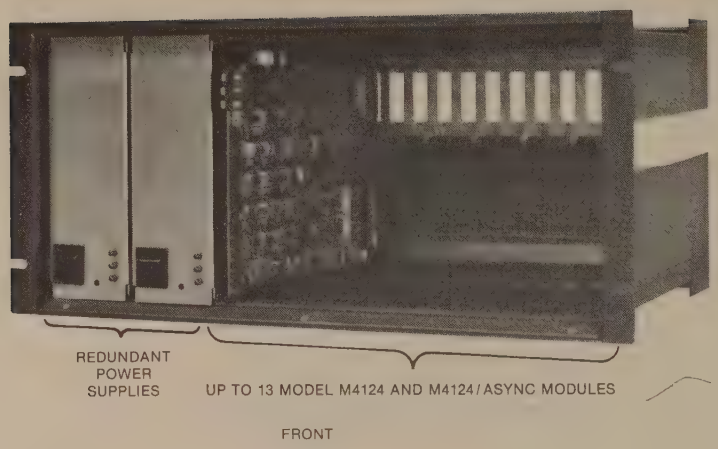
The regulated dc power requirements for 13 modems are +5 V at 4 A and ± 12 V at 1.5 A. These are supplied by either a single plug-in power supply module or two such modules operating in a redundant mode. Each power supply contains an internal fuse and a strap for selecting 115 V ac (USA) or 230 V ac (export) operation.

Alternating current to the rack-mount chassis is furnished by a 6-foot, 3-wire power cord.

Alternating current to each power supply module is individually controlled by a rocker switch mounted on the front of the unit.

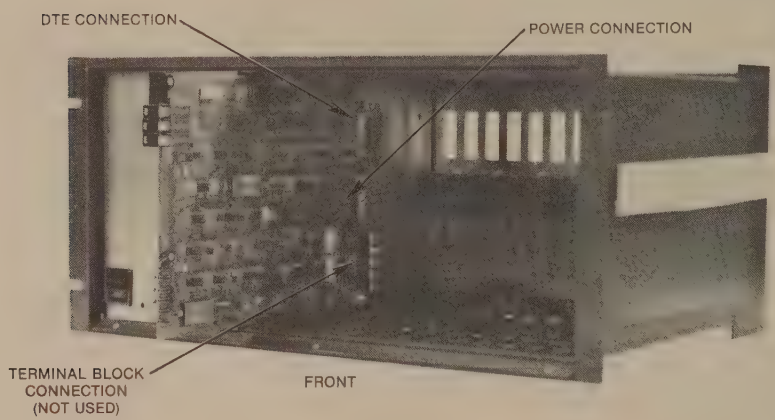
The backplane of the M4100 has 13 terminal blocks for connecting the transmit and receive wire pairs and a ground wire to each modem. It also has edge connector sockets for power connection, and openings for connecting DTE cables to the modems. (See figure 3-2.)

U4024/ASYNC, the Field Upgrade Kit Option, converts a Model M4024 to a Model M4024/ASYNC. In addition, oscillators can be replaced to change the percentage of overspeed. MICOM distributors will have more detailed information. Refer to Field Upgrade Kit Installation Procedure, Stock Number 800-1107.

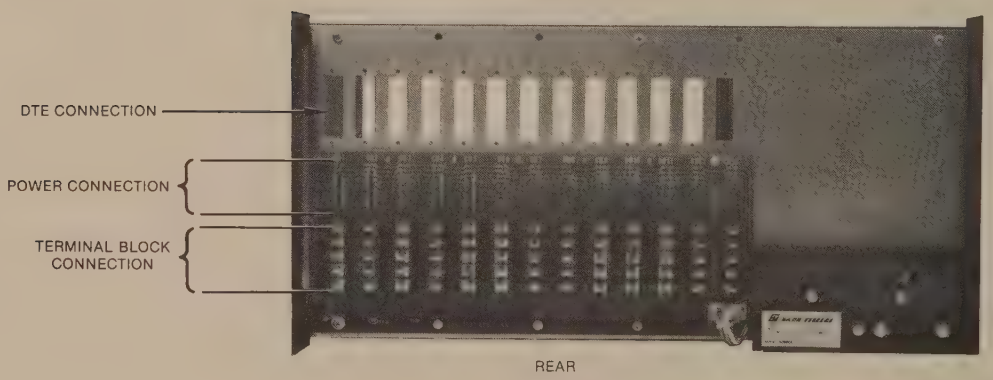


MP-4000-09.1

Figure 3-1. Model M4100 Rack-Mount Chassis



MP-4000-06.3c



MP-4000-10.1

Figure 3-2. Cabling for M4100

3.2 STRAPPING SELECTION

3.2.1 Carrier Detect Threshold (Strap W1 - CDET)

Strap W1 selects between two Carrier Detect ON thresholds, -40 for -40 dBm and -26 for -26 dBm. (See table 2-3.)

The OFF threshold is 4 to 6 dB below the selected threshold. The normal setting is -26 dBm. However, strap to -40 dBm if your receive level is expected to be below -24 dBm.

3.2.2 Phase Shift Select (Strap W2 - PSS)

Strap W2 selects between two phase shift options, Alternative A or B. (See table 2-3.)

- Alternative A strapping is used on USA units (CCITT V.26A).
- Alternative B strapping is used on export units (CCITT V.26B/Bell 201B/C).

3.2.3 Asynchronous/Synchronous Data Select (Strap W3 - Mode)

Strap W3 selects or bypasses the asynchronous interface. The type of DTE with which the modem communicates, determines whether asynchronous or synchronous mode is required. (See table 2-3.)

- ASY strapping selects for asynchronous interface
- SYN strapping bypasses the asynchronous interface.

3.2.4 Line Loopback Gain (Strap W4 - LBG)

Strap W4 selects the modem line loopback gain. (See table 2-3.)

- Position 12 strapping selects a 12 dB gain, as used on USA units.
- Position 0 strapping selects a 0 dB gain, as used in international applications.

3.2.5 DSR Option and Analog Loopback (Strap W5 - DSR)

Strap W5 selects DSR to be ON or OFF. (See table 2-3.)

- Position ON strapping selects DSR to be ON at all times.
- Position OFF strapping selects DSR to be OFF when line loopback is active.

If the DTE requires DSR, then strap to ON to allow local modem testing.

3.2.6 Switched or Continuous Carrier (Strap W6 - Car)

Strap W6 selects either a switched or continuous carrier signal. (See table 2-3.)

- Position CON strapping holds RTS ON internally in the modem and keeps CTS ON continuously.
- Position SW strapping requires the DTE to turn ON RTS and wait for an ON condition on CTS (after the selected RTS-to-CTS delay) prior to transmitting data.

If the DTE does not provide RTS, strap the modem to CON (point-to-point only). Multipoint operation requires SW strapping at the remote modems.

3.2.7 External/Internal/Slave Clocking (Strap W7 - Clk Sel)

Strap W7 selects the method of clocking. Three strap positions are available: EXT, INT, and SLV. (See table 2-3.)

- Position EXT strapping synchronizes the modem transmit clock with the external clock input. The accuracy of the external clock must be within 0.01%.
- Position INT strapping derives the Data Communications Equipment (DCE) transmit clock from the internal crystal oscillator.
- Position SLV strapping internally connects the receive clock output to the designated slaved transmitter to be timed by its received timing. The received timing is based on signals from the master timing source. Slave timing is disabled when the modem is in test mode.

3.2.8 Data Rate Select (Strap W8 - Rate)

Strap W8 selects the data rate. Three strap positions are available: EXT, 2.4, and 1.2. (See table 2-3.)

- Position EXT strapping selects the rate externally. The Data Signal Rate Select pin on the interface connector (pin 23) controls the data rate. A positive voltage selects 2400 bps operation; a negative voltage selects 1200 bps operation.
- Position 2.4 strapping sets the data rate to 2400 bps.
- Position 1.2 strapping sets the data rate to 1200 bps. The 1200 bps data rate is designed for degraded line usage.

3.2.9 Asynchronous Stop Bit Select (Strap W9 - STB)

Strap W9 selects an optional asynchronous interface. (See table 2-6.)

- Position 1 strapping sets the modem to transmit with one stop bit.
- Position 2 strapping sets the modem to transmit with two stop bits.

3.2.10 Asynchronous Code Level Select (Strap W10 - Code Level) - see table 3-1

Asynchronous code levels of 6, 7, and 8 bits are selectable by placing strap W10 in positions 6, 7, and 8, respectively. (See table 2-6.)

3.2.11 Asynchronous Parity Select (Strap W11 - Parity) - see table 3-1

Even, odd, and no parity are selected by placing strap W11 in positions EVEN, ODD, and NONE, respectively. (See table 2-6.)

The strapping chart in table 3-1 is provided to aid you in strapping for asynchronous data. You must know the composition of the data character being transmitted.

Table 3-1. Strapping Chart for M4024/ASYNC and M4124/ASYNC Option

Character Information Bits	Strap Modem For	Notes
9 bits, including odd or even parity	8 bits, odd or even parity	1, 2
8 bits with no parity	8 bits, no parity	3, 4
8 bits, including odd or even parity	7 bits, odd or even parity	2, 5
7 bits with no parity	7 bits, no parity	3, 6
7 bits, including odd or even parity	6 bits, odd or even parity	2, 7
6 bits with no parity, or odd or even parity	6 bits, no parity	3, 8

NOTES:
1. Ninth data bit will be odd or even, depending on strapping.
2. Modem enforces parity in these modes.
3. Modem does not enforce parity in these modes.
4. Eighth data bit may be odd, even, mark, or space.
5. Eighth data bit will be odd or even, depending on strapping.
6. Seventh data bit may be odd, even, mark, or space.
7. Seventh data bit will be odd or even, depending on strapping.
8. Sixth data bit may be odd, even, mark, or space.

3.3 SWITCH SETTING SELECTION (see table 2-2)

3.3.1 Equalizer Option (Switch Group S5, Position 1)

With switch position 1 OFF, data is taken from the equalizer. With switch position 1 ON, the equalizer is bypassed.

The equalizer circuit compensates for lack of equalization on an unconditioned communications line.

RULE 1 — When in doubt, equalize.
RULE 2 — On short conditioned lines, don't equalize.
RULE 3 — When rule 1 doesn't work, try rule 2; and vice versa.

3.3.2 RTS-to-CTS Delay (Switch Group S5, Positions 2 and 3)

A time delay is used between the Request-To-Send signal going active and the Clear-To-Send signal responding. This delay provides a training signal to the remote modem receiver that enables it to synchronize with the transmitter before data is transmitted. Three time delays are available: 9 ms, 25 ms, and 150 ms (each ± 1 ms). See table 2-2 for the combinations of switch settings.

The 9 ms ± 1 ms delay is typically chosen. If the DTE requires a longer delay or the line is impaired, one of the other delays should be chosen. Longer delays ensure more reliable synchronization over degraded lines.

3.3.3 Data Clamp Delay (Switch Group S5, Positions 4 and 5)

The Data Clamp Delay holds Received Data to a Mark condition for a specified period after Carrier Detect goes active. There are three time delays available: 4 ms, 21 ms, and 104 ms (each ± 1 ms). The switch position settings for these delays are described in table 2-2.

The Data Clamp is an electronic circuit that holds the receiver output of the modem constant when no data is being received. This avoids noise interference. Select the Data Clamp Delay value nearest to the RTS-to-CTS delay value chosen at the remote modem (e.g., if RTS-to-CTS delay is 9 ms, select 4 ms for Data Clamp). Typically, the 4 ms ± 1 ms value is chosen.

3.3.4 Output Level (Switch Group S1, Positions 1, 2, 3, and 4)

The transmitter output level is switch-selectable in 1 dB increments from 0 dBm to -15 dBm. See table 2-2 for the switch position settings.

In the USA, use 0 dBm unless your telephone company specifies differently. Outside the USA, contact your PTT for the correct level.

3.4 READING YOUR MODEM DISPLAY

Table 3-2 provides a general interpretation of the modem's indicators. A display is defined as a series of lighted light-emitting diode (LED) indicators. The various displays then indicate the condition of transmitted and received data.

Table 3-2. Display Functions

Display Indicator	Function	Indication	Meaning
TD	Transmitted Data	ON	Space data
RD	Received Data	ON	Space data*
RTS	Request-To-Send	ON	When RTS input is active
CTS	Clear-To-Send	ON	When modem is ready to accept data
CD	Carrier Detect	ON	When carrier is detected
DSR	Data Set Ready	ON	When the modem is powered and **DSR** option is strapped to ON

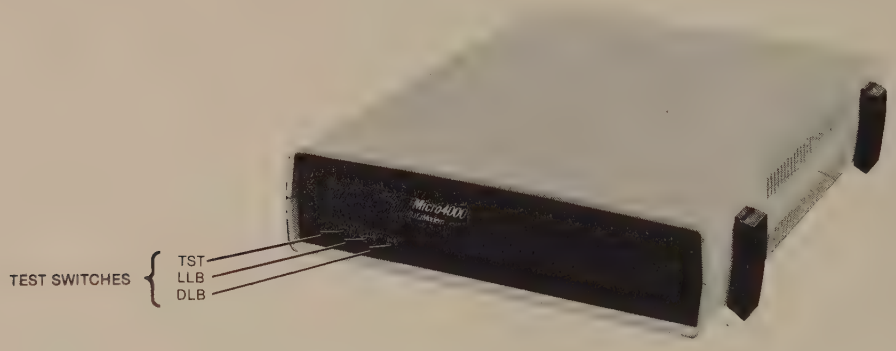
* When the modem is in the self-test mode, the **RD** indicator will be ON for detected errors.

Figure 3-3 shows the location of the modem's indicators.

Figure 3-3. Modem Display Location

3.5 USING THE DIAGNOSTIC TESTS

Four tests are provided to help you isolate the cause of faults you may encounter while operating your modem. The tests are initiated by three test switches. See figure 3-4 for the location of the switches on the modem.



MP-4000-01.3

Figure 3-4. Location of Test Switches

3.5.1 Modem and Line Tests

Your modem has three test modes:

1. *Line Loopback* — connects the modem line output to the receiver input; also loops the receive line back to the transmit line.

2. *Digital Loopback* — connects the modem receive data internally to transmit data along with associated timing and control circuits.

3. *Self/Line Test* — transmits the modem's internal pseudo-random data pattern on the modem's line output. The pseudo-random data pattern, when looped back to the generating modem or when received by the remote modem, allows data errors to be detected by monitoring the **RD** indicator.

Modem and Line testing consists of a sequence of four tests:

1. *Local Modem Test* — checks the local modem (using line loopback and modem line test modes at the local modem).

2. *Local Modem and Line Test* — checks the local modem and the line between the modem units (using line loopback test mode at the remote modem and modem line test mode at the local modem).

3. *Local Modem, Line, and Remote Modem Test* — checks the local modem, the line between the modem units, and the remote modem (using modem digital loopback test mode at the remote modem and line test mode at the local modem).

4. *Full-Duplex Line Test* — checks the local modem, the line between the units, and the remote modem (using modem line test at both modems).

In all of these cases, a pseudo-random data pattern is generated and checked by the modem. If the pattern is received with errors, the **RD** indicator on the modem FLASHES; otherwise, the **RD** indicator remains OFF indicating error-free reception of the pseudo-random data pattern.

In a multipoint configuration, repeat these tests between the local modem and each remote modem, one at a time, in sequence.

3.5.2 Local Modem Test

To start this test:

1. Press the LLB switch (putting local modem into the line loopback test mode).
2. Press the TST switch. A pseudo-random data pattern will be generated in the local modem. (See figure 3-5.)

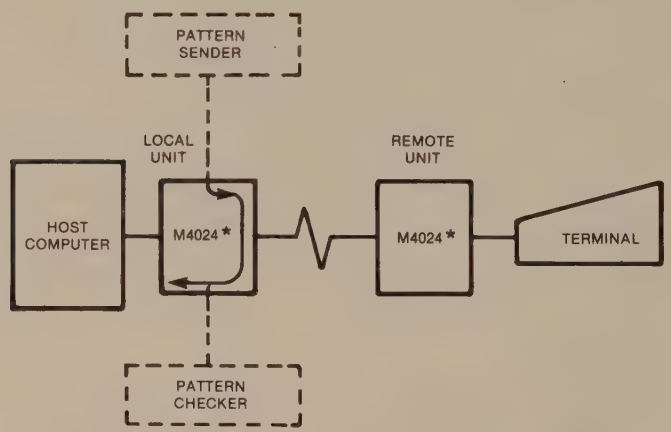
The display at the local modem should be:

DSR — OFF (unless strapped to be ON in LLB)
RTS — ON
CTS — ON
CD — ON

Errors will be shown on the local modem by **RD** FLASHING. **RD** OFF indicates error-free operation.

To end this test:

1. Release the TST switch.
2. Release the LLB switch.



*ALSO FOR M4124, M4024/ASYNC, OR M4124/ASYNC.

MI-4000-06

Figure 3-5. Local Loopback Data Flow

3.5.3 Local Modem and Line Test

To start this test:

1. Press the LLB switch of remote modem (putting the remote modem into the line loopback test mode).

2. Press the TST switch of local modem. A pseudo-random data pattern will be generated in the local modem. (See figure 3-6.)

The display at the local modem should be:

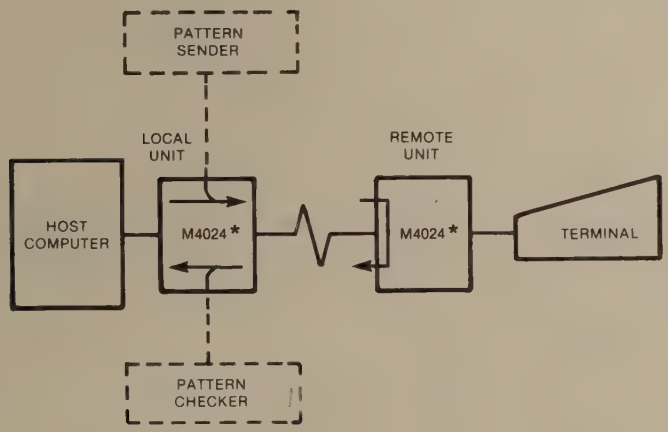
DSR — ON
RTS — ON
CTS — ON
CD — ON

Errors will be shown on the local modem by **RD** FLASHING. **RD** OFF indicates error-free operation.

To end this test:

1. Release the TST switch.

2. Release the LLB switch.



*ALSO FOR M4124, M4024/ASYNC, OR M4124/ASYNC.

MI-4000-07

Figure 3-6. Local Modem and Line Data Flow

3.5.4 Local Modem, Line, and Remote Modem Test

To start this test:

1. Press DLB for remote modems (putting the remote modem into the digital loopback test mode).

2. Press the TST Switch for local modems. A pseudo-random data pattern will be generated in the local modem. (See figure 3-7.)

The display at the local modem should be:

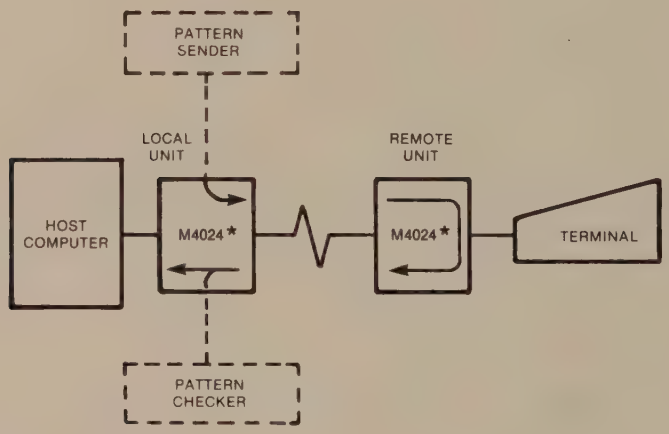
DSR — ON
RTS — ON
CTS — ON
CD — ON

Errors will be shown on the local modem by **RD** FLASHING. **RD** OFF indicates error-free operation.

To end this test:

1. Release the TST switch.

2. Release the DLB switch.



*ALSO FOR M4124, M4024/ASYNC, OR M4124/ASYNC.

MI-4000-08

Figure 3-7. Local Modem, Line, and Remote Modem Data Flow

3.5.5 Full-Duplex Line Test

To perform the full-duplex test, press the TST switch of the local and remote modems. See figure 3-8.

The displays at both modems should be:

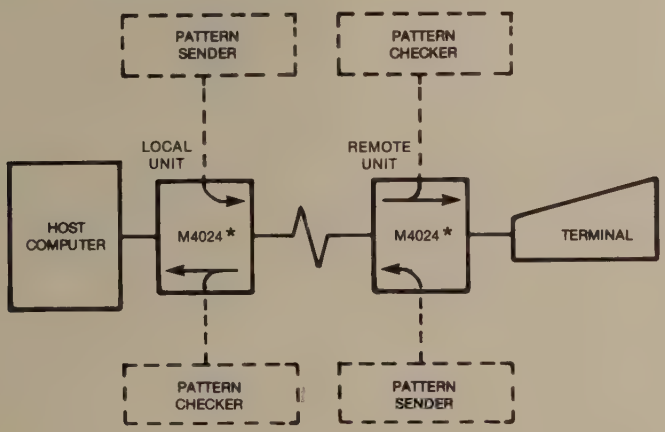
RTS — ON
CTS — ON
CD — ON
DSR — ON

NOTE

The full-duplex line test, checks transmission in each direction — simultaneously, but separately. When the **RD** indicator flashes on a modem, it indicates a fault in the receive data path for that modem.

Errors will be shown on either modem by **RD** FLASHING. **RD** OFF indicates error-free operation.

To end this test, release TST switches at both modems.



*ALSO FOR M4124, M4024/ASYNC, OR M4124/ASYNC.

MI-4000-12

Figure 3-8. Full-Duplex Line Data Flow

APPENDIX A
CABLE WIRING

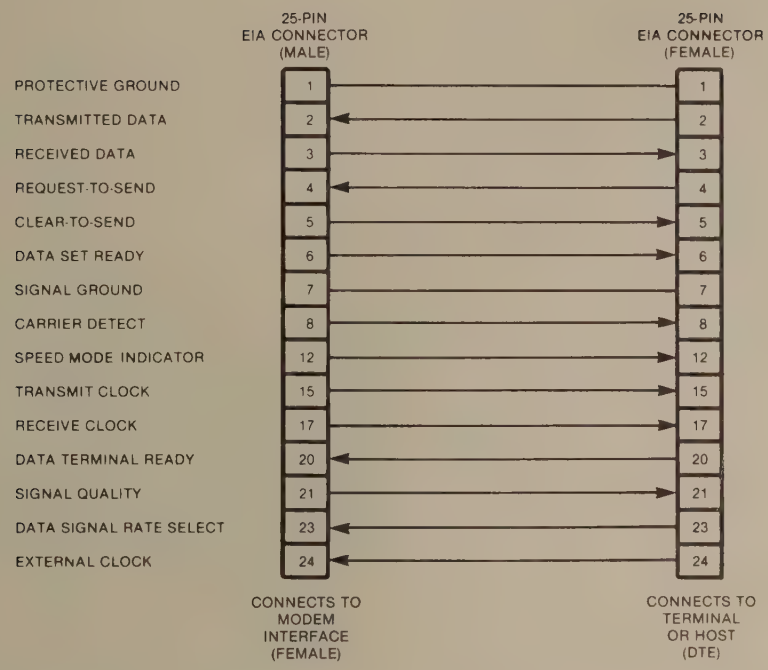


Figure A-1. Typical Terminal Cable Pin Assignments

APPENDIX B
TECHNICAL SPECIFICATIONS

Clear-To-Send Delay:	9, 25, or 150 ms, strap-selectable
Line Interface:	600 ohms impedance, transformer coupled and transient protected
Line Requirement:	4-wire leased, point-to-point (conditioned or unconditioned) or multipoint (conditioned*) line
Loopback Tests:	At the modem digital interface, the Digital Loopback test returns received data to the line. It also returns the terminal's transmitted data to the terminal. At the modem telephone line interface, the Line Loopback test returns transmitted data to the terminal. It also returns data received from the line to the remote modem. The Test Pattern test generates a pseudo-random data pattern for use with loopback tests.
Modem Type:	Compatible with Bell 201B and 201C, and CCITT Recommendation V.26 (A and B Modes)
Modulation:	Four phase, differentially coherent phase shift keying
Operating Environment:	32-114 °F (0-45 °C), 0-95% relative humidity
Physical Dimensions:	Standalone (Standard): 8 3/4 inches (21.8 cm) wide; 2 1/8 inches (5.3 cm) high; 11 1/4 inches (28.1 cm) deep; Weight: 4 pounds (1.8 kg) Rack-Mount (Option): 19 inches (48.3 cm) wide; 8 3/4 inches (21.8 cm) high; 13 3/8 inches (34.0 cm) deep; Weight: 27 pounds (12.2 kg)
Power:	Standalone: USA: 90-133 V ac, 47-63 Hz, 10 watts Export: 180-266 V ac, 47-63 Hz, 10 watts Rack-Mount: +5 V dc at 4 amps, ±12 V dc at 5 amps, 80 watts (13 modules)
Receiver Sensitivity:	Range 0 to -43 dBm

* In the USA, use C2 conditioning or equivalent; internationally, use M1020 or equivalent.

Terminal Interface:	*Models M4024 and M4124:* EIA RS-232-C (CCITT V.24/V.28), serial synchronous, female 25-pin connector; internal or external clock *Models M4024/ASYNC and M4124/ASYNC:* EIA RS-232-C (CCITT V.24/V.28), serial asynchronous interface
Transmission Speed:	2400 bps or 1200 bps
Transmitter Output Level:	0 to -15 dBm, selectable in 1 dB steps

SUBJECT INDEX

A

Access to Internal Controls 2-6
Applications 1-2
Asynchronous
  Code Level 2-13, 3-5
  Parity 2-13, 3-5
  Stop Bit 2-13, 3-4
Asynchronous/Synchronous Data Select 2-10, 2-13, 3-3
ASYNC Straps 2-13

C

Cabling
  Cable Wiring A-1
  Power Supply 2-16, 2-17, 2-18
Carrier Detect 2-10, 3-3
Checklist 2-2
Clocking 2-10, 3-4
Code Level 2-13
Configuration Switches (see Switches)
Connection to Communications Line 2-15, 3-1
Continuous Carrier 2-10, 3-4
Customer Service Warranty

D

Damage 2-1, 3-14
Data Rate 2-10, 3-4
Delay
  Data Clamp 2-8, 3-6
  RTS/CTS 2-8, 3-6
Dimensions 2-5, B-1
Display (see also LED) 2-17, 2-18, 3-7
DSR Option 2-10, 3-3

E

Equalizer Option 2-8, 3-6
External Slave Clocking 2-10

F

Field Upgrade (Kit) 1-1, 3-1

I

Internal Access (to Unit) 2-6
Internal Slave Clocking 2-10

L

Latches 2-6
LEDs (Light Emitting Diodes)
  Initialization 2-17, 2-18
  Location 3-7
  See also Display
Line Loopback Gain 2-10, 3-3
Location of Unit 2-5
Loopback Tests 3-9 through 3-13, B-1

M

Modem Test 3-9 through 3-13
Modulation B-1
Multipoint
  Application/Configuration 1-2
  Applying Power 2-17, 2-18
  Typical Strapping 2-11

O

Operating Environment B-1
Optional Features 1-1, 3-1
Output Level 2-8, 3-6, B-1

P

Parity 2-13, 3-5
Phase Shift Select 2-10, 3-3
Power Supply
  Connection to Unit 2-16
  Power 2-16, 3-1, B-1
Point-to-Point
  Application/Configuration 1-2
  Applying Power 2-17, 2-18
  Typical SYNC Strapping 2-11
  Typical ASYNC Strapping 2-13

SUBJECT INDEX (continued)

R

Rack-Mount Option 2-6, 3-1, 3-2
Rate (see Data Rate)
Repair Service Warranty
RTS/CTS Delay 2-8

S

Self/Line Test 3-9
Specifications B-1
Stop Bit 2-13, 3-4
Straps
  Access to 2-6
  Location 2-9, 2-12
  Parameters affected by 2-10, 2-13, 3-3 thru 3-5
  Setting 2-10, 2-13
  Typical ASYNC Point-to-Point 2-13
  Typical SYNC Multipoint 2-11
  Typical SYNC Point-to-Point 2-11
Switched Carrier 2-10, 3-4
Switches
  Access to 2-6, 3-8
  Location 2-7, 3-8
  Settings/Configuration 2-8, 3-6
  Test 3-8, 3-10 thru 3-13
SYNC Straps 2-9

T

Technical Specifications B-1
Terminal Block 2-15
Test Switches (see Switches/Test)
Testing 3-9 thru 3-13
Trouble Detection 3-7

U

Unfastening Latches 2-6
Unpacking 2-1

W

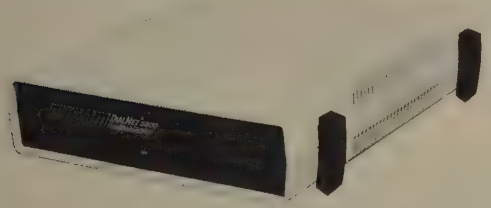
Warranty

INTERESTED IN OTHER MICOM DATA COMMUNICATIONS PRODUCTS?

Modems

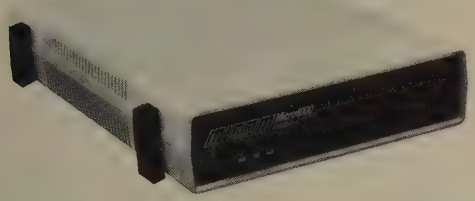
3000 • DIAL NETWORK COMMUNICATIONS

The DIALNET™3000 product line contains very attractively priced modems designed to transmit data effectively over the direct distance dial (DDD) network at speeds of 2400 or 1200 bps. Models are available that are compatible with CCITT V.22 *bis*, Bell 212, Bell 103, or Racal Vadic 3400. All models (except Models M3012TA and M3212TA, which operate in manual answer or auto-answer mode only) operate in a manual originate and an auto-answer mode and are offered in standalone or rack-mount versions. *Plus* series models add auto-dial features.



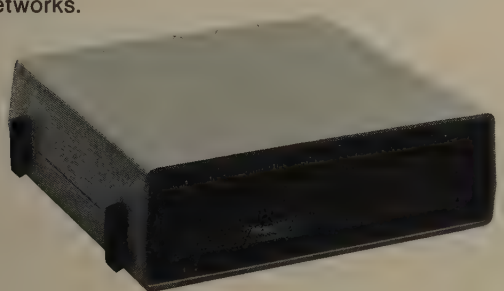
4000 • HIGH-SPEED COMMUNICATIONS

The Micro4000 Data Modem family is a series of inexpensive data modems operating at speeds from 2400 to 9600 bps. The modems conform fully to CCITT specifications and *all* models are suitable for both multipoint and point-to-point applications. Both 4800 and 9600 bps models feature a *speedshift* fast poll operation. A unique *asynchronous* 2400 bps modem is offered for use with teletype-compatible, "dumb" CRT and printing terminals.



8000 • MULTI-TERMINAL COMMUNICATIONS

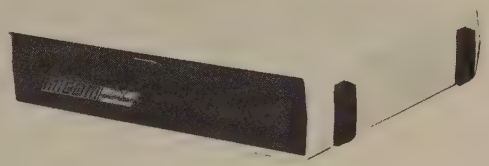
The Micro8000 Concentrator Modem is the world's first high-speed modem series with built-in data concentrator and automatic retransmission-on-error. The model range supports from 2 to 16 asynchronous or synchronous terminals and operates at speeds of 2400, 4800, and 9600 bps point-to-point or multipoint, over any standard telephone line. Concentrator PAD models are also offered for access to Packet Data Networks.



Protocol Conversion

7400 • IBM 3270 EMULATION

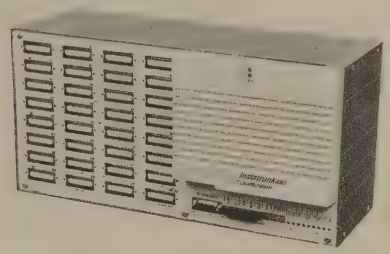
MICOM's Micro7400 is a low-cost substitute for IBM's 3274 Model 61C terminal controller that allows *asynchronous* terminals, printers, teleprinters, and personal computers to be used as IBM 3270-type terminals. The Micro7400 provides asynchronous terminal users with a *gateway* into IBM and provides IBM users with a means of accessing asynchronous devices.



Multiplexing

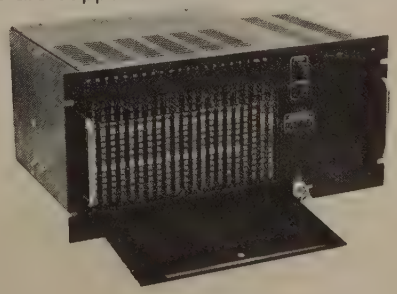
480 • LOCAL MULTIPLEXOR

MICOM's INSTATRUNK™480 T1 Local Multiplexor is a time-division multiplexor with a 1.544 Mpbs bandwidth—which allows it to carry *up to 128 channels, each of which can operate at up to 9600 bps.* Its signal can be transmitted over two twisted wire pairs for a distance of more than 1 mile. And, since the INSTATRUNK multiplexor uses standard T1 format, its signal can also be carried over longer distances by T1 repeaters, microwave links, or telephone company lines.



750 • WIDEBAND MULTIPLEXING

The Micro750 Wideband Multiplexor is a time-division multiplexor (TDM) designed to derive multiple synchronous channels from a single wideband circuit operating at 40.8, 48, 50, 72, or 256 kbps—or a DDS circuit operating at 56 kbps. The Micro750 can also be used to provide speed conversion between 50 and 56 kbps—or any other two wideband rates. EIA RS-232-C (CCITT V.24/V.28), CCITT V.35, Bell 303, CCITT V.11, and EIA RS-449 high-speed composite interfaces are supported.



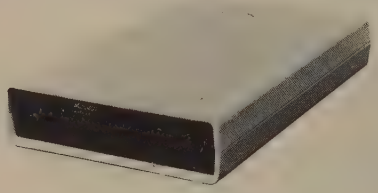
Network and Switching

600 • DATA SWITCHING

The Micro600 Port Selector is a data PABX, providing switching capabilities of contention and port selection for up to 1504 asynchronous lines/ports. With its plug-in INSTAMUX and INSTATRUNK multiplexors and Micro800/2 concentrators plus its Interconnect Facility, the Micro600 is the heart of MICOM's INSTANET approach to local networking. (The Micro650 provides a similar capability for up to 126 *synchronous* lines/ports.)

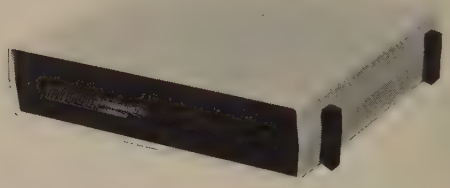
400 • SHORT-HAUL COMMUNICATIONS

The Micro400 Local Dataset family provides low-cost, full-duplex asynchronous or synchronous data transmission over distances up to 20 miles, point-to-point or multipoint. A special *smart* asynchronous model provides dial-up emulation for use with timesharing systems. All synchronous models can be connected directly to a Micro600 Port Selector quad module, providing a very low-cost solution for local data distribution applications. (For example, Model M400/600 is specifically designed for inexpensive terminal-controlled applications with the Micro600.) Local Dataset models are Bell 43401-compatible and operate over telephone company unloaded metallic circuits.



470 • SHORT-HAUL MULTIPLEXING

The INSTAMUX™470 is an extremely low cost *multiplexing line driver* which allows up to eight asynchronous terminals to communicate over two twisted pairs of wires at distances of up to 5000 feet. The INSTAMUX™470 is transparent to terminal code and speeds to 19,200 bps. MICOM also offers integral module versions of the INSTAMUX™470 for installation in the Micro600 Port Selector.



Error Control

500 • ERROR-FREE COMMUNICATIONS

The Micro500 Error Controller eliminates transmission errors for teletype-compatible CRT and printing terminals and interactive graphics terminals communicating over telephone lines at speeds to 9600 bps. It also provides *asynchronous-to-synchronous* conversion allowing asynchronous terminals to operate with synchronous modems, and permits *full-duplex* asynchronous interactive terminals to operate with *half-duplex* synchronous modems at 2400 or 4800 bps on the dial network. MICOM offers an error controller with built-in modems (at 2400, 4800, or 9600 bps) called the Micro5000 Intelligent Modem.

460 • DATA/VOICE MULTIPLEXING

The INSTALINK™460 Data/Voice Multiplexor allows simultaneous voice and data transmission utilizing *existing* in-plant telephone wiring. The INSTALINK™460 system consists of data/voice multiplexors at the users' telephones and a central chassis at the telephone PABX equipment room which connects to the user's computer or data PABX. INSTALINK™460 units operate at speeds up to 19,200 bps over distances up to 5000 feet and are *FCC Part 68 registered.*

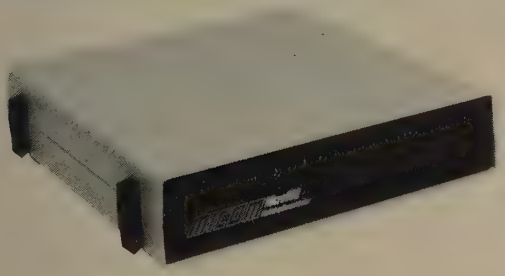
Data Concentration

800/2 • STATISTICAL MULTIPLEXING

The Micro800/2 Data Concentrator is a low-cost second generation statistical multiplexor which allows up to sixteen terminals, both synchronous and asynchronous, to share a single telephone line. Retransmission-on-error between concentrators is automatic. Special low-cost models are offered for users of Hewlett-Packard HP 3000 computer systems. The Micro200 Port Concentrator, Model M220, allows Micro800/2 users to achieve additional system economics by reducing the number of computer ports required to support remote terminal clusters.

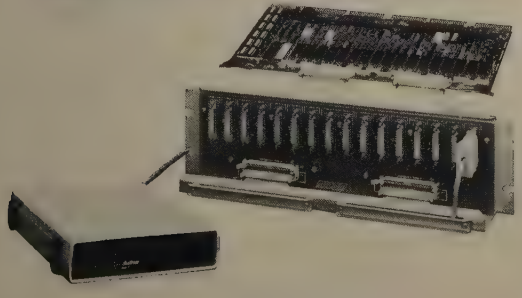
900 • MULTIDROP STATISTICAL MULTIPLEXING

The Micro900 Multidrop Concentrator permits up to 16 asynchronous, "dumb" terminals to share a single telephone line, multidropped in up to 16 separate locations. It allows multidropping of " dumb" terminals without polling software and provides automatic retransmission-on-error to ensure *error-free* communications.



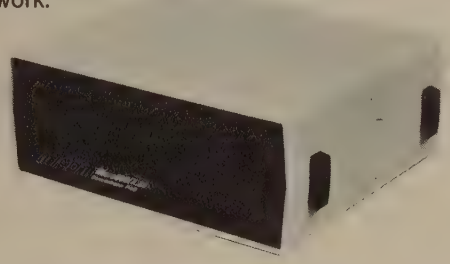
1011 • UNIBUS® MULTIPLEXING

The Series 11 BusDriver™ is *both* a DEC UNIBUS® replacement (for DH11™ or DZ11™ multiplexors) for local channel access *and* a port concentrator for remote data concentration. The BusDriver™ provides access into a PDP™-11 or VAX™ computer for up to 32 asynchronous terminals via a single HEX-size UNIBUS® module and is *fully* DEC-diagnostic compatible. A 16-connector panel provides access for local terminals and concentrated data streams. Options include expansion Remote Concentrator Controllers and integral 2400, 4800, or 9600 bps modems.



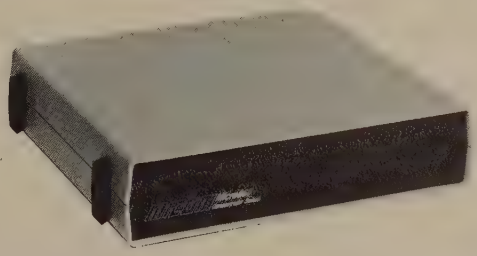
800/X.25 • PACKET ASSEMBLY/DISASSEMBLY

The Micro800/X.25 Concentrator PAD is an *extremely low-cost* Packet Assembler/Disassembler (PAD) Concentrator which provides asynchronous terminal concentration for Packet Data Networks by combining field-proven Micro800/2 features with CCITT Recommendations X.25, X.3, X.28, and X.29. Each unit has a Command Port for local terminal control; plus, optional Network Control Facility Software is offered for *centralized* management of a Micro800/X.25 PAD network.



860 • CONCENTRATOR SWITCHING

The Micro860 Concentrator Switch is a low-cost *data concentrator switch* which interconnects up to eight Micro800/2 Data Concentators. The Micro860 operates as the hub of a network to allow any asynchronous channel on any of the data concentrators to connect with *any* channel on that or any other data concentrator. Standard Micro860 features include port switching, port contention, network command and log ports, and local switching.



Micom Seminar on Data Communications

If you would like to learn more about the subject of data communications, MICOM organizes tutorial Seminars designed especially for the minicomputer user. The Seminars are offered nationwide throughout the year. Please call us to request a Seminar program and schedule. Act *now* to reserve your seat—space is limited.

From: _____

_____

_____

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 906 SIMI VALLEY, CA 93062

POSTAGE WILL BE PAID BY ADDRESSEE

MICOM Systems, Inc.
4100 Los Angeles Avenue
P.O. Box 8100
Simi Valley, CA 93062-8100

FOR FURTHER INFORMATION, PLEASE COMPLETE AND MAIL THIS CARD.

☐ Please have your representative call me to discuss my needs.

My application is: _____

Please send me your sales literature on:

☐ MICOM's products for minicomputer users

☐ MICOM's "Data Communications for Minicomputer Users" Seminar

☐ Products for Systems Houses and OEMs

☐ These MICOM products _____

SEND INFORMATION REQUESTED ABOVE TO:

Name _____ Title _____

Company _____ Phone ( ) _____

Address _____

City _____ State _____ Zip _____

FOLD THIS SHEET AS MARKED AND TAPE CLOSED BEFORE MAILING

PUBLICATION CHANGE REQUEST

A message to our readers: we try to make our product manuals as accurate, complete, and easy to use as possible. If you have an improvement to suggest (or find an error in this manual), **LET US KNOW:**

a. Fill in the four sections below.
b. Staple any marked-up pages to this side of request form.
c. Fold entire package in thirds—so that the MICOM address shows.
d. Staple package shut.
e. Fill in your return address in the space provided on both sides of this request form.
f. Drop in mail box.

MANUAL IDENTIFICATION (take from the title page of your manual)

EQUIPMENT COVERED (take model number from silver tag on unit) _____

DATE OF MANUAL _____ STOCK NUMBER _____

PROBLEM *

_____

_____

_____

_____

_____

SUGGESTED SOLUTION *

_____

_____

_____

_____

_____

READER IDENTIFICATION

NAME AND TITLE _____ DATE _____

ADDRESS _____ TELEPHONE ( ) _____

_____

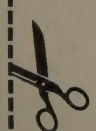
---

* The best way to help us identify and correct the problem you discovered is to attach marked-up copies of the affected pages.

Thank you for taking the time and making the effort to fill in this request. We will review and respond to your request by return mail.

MICOM Technical Publications

MICOM Form No 1077b



Fold Here

From:_____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 906 SIMI VALLEY, CA 93062

POSTAGE WILL BE PAID BY ADDRESSEE

MICOM Systems, Inc.
ATTENTION: Publication Change Control
4100 Los Angeles Avenue
P.O. Box 8100
Simi Valley, CA 93062-8100

Fold Here

Corporate Headquarters
MICOM Systems, Inc.
4100 Los Angeles Avenue
P.O. Box 8100
Simi Valley, CA 93062-8100
Telephone (805) 583-8600
TWX 910/494-4910
Telex 687497

Regional Sales/Service
Atlanta, GA (404) 435-2999
Boston, MA (617) 527-4010
Chatsworth, CA (818) 998-8844
Chicago, IL (312) 964-0551
Dallas, TX (214) 258-0774
Denver, CO (303) 355-5110
San Francisco, CA (415) 327-0890
St. Louis, MO (314) 576-7626
Teaneck, NJ (201) 836-4000

United Kingdom
MICOM-Borer Ltd.
Bel Court, 15 Cradock Road
Reading, Berkshire RG2 0JT
Telephone (0734) 866801
Telex 847135